Superior Humeral Head Resurfacing in Compensated Cuff Arthropathy

**Background:**

Patients with massive rotator cuff tears present clinical challenges particularly when encountered in those younger than 65 years old. A subset of patients present with Compensated Cuff Arthropathy (CCA) which is defined as a functional force coupling of the deltoid and remaining rotator cuff using the glenoid or acromion as a fulcrum for active forward elevation to ≥90° when pain generators have been addressed.

Since the 2004 FDA clearance of reverse shoulder arthroplasty (RSA) (Fig. 2), the procedure has gained increasing popularity. From a historical perspective, reverse shoulder arthroplasty in the US increased from 2000 cases annually in 2004 to an estimated 22,000 in 2011 representing 43% of all total shoulder replacements performed. Despite the biomechanical advantages of the procedure, recent reports have outlined problems such as scapular notching (35% - 96%) including shoulder dislocation or subluxation (2.8% - 17.5%) and glenoid fractures (10%). Revision rates ranged from 3.3% - 27%, reoperation rates ranged from 8.8% - 33%, and implant removals were performed in 10.3% - 15%.

The purpose of this review was to establish consensus among clinicians and experts on the use of superior humeral head resurfacing (HemiCAP, Arthrosurface, Franklin, MA) (Fig. 1) as an option to address CCA in a targeted patient population.

**Results:**

12 shoulder surgeons participated in this multicenter survey to present their experience from 134 HemiCAP resurfacing procedures performed for this indication. As a group, the experience spans more than 60 years treating and observing related outcomes.

The study group defined a specific subset of patients with CCA. Individual patient assessment is therefore critical. History, physical examination and radiographic imaging provide the necessary guidance during the pre-selection process, but the final indication is reconfirmed arthroscopically (Fig. 3).

The group expressed a strong consensus on the importance of subscapularis preservation in this patient cohort (Critical: 41%, Very Important: 42%, Important: 17%). The majority...
(67%) indicated that they changed their standard surgical approach to preserve the subscapularis by using either a modified deltopectoral approach, extending the shoulder and dislocating through the rotator interval, or by performing the procedure through a deltoid splitting approach.

Satisfaction with the surgical instrumentation was rated as good (8%), very good (50%), or excellent (42%). Postoperatively, all participants reported an overall good (25%), very good (42%), or excellent (33%) resolution of symptoms in their patients with emphasis on pain relief and compensated functional improvement. Patient satisfaction was rated as good (33%), very good (42%), or excellent (25%).

When compared to surgical alternatives, 82% felt that the return to activity and sporting was faster with HemiCAP resurfacing (18% equal). Similarly, the return to work was considered faster (64%) or equal (36%).

When asked about the overall complication rate, 82% agreed that it was lower when compared to other surgical alternatives (18% equal).

No signs of progressive implant loosening, subsidence or cyst formation were observed and no implant related failures were recorded to date.

**Discussion and Conclusion:**

Gerber et al. reported results in patients under the age of 65 years treated with RSA for massive irreparable rotator cuff tears9. The authors concluded that “it is imperative that the high complication and reoperation rate is discussed in depth with the patient with analysis of risk vs. benefit clearly and carefully considered before surgery”.

As an early stage intervention, superior humeral head resurfacing is the least invasive and most joint preserving arthroplasty procedure and demonstrates a promising benefit profile (Table 1). The low invasive nature of the procedure lends itself for high demand patients and those who will not comply with postoperative RSA precautions and activity restrictions.

Resurfacing can be effectively performed through a subscapularis preserving approach thus preventing surgical trauma, functional weakening and other possible complications. DeFranco reported a postoperative dysfunction of the subscapularis tendon following a deltopectoral approach to be as high as 67%10. This added risk should be avoided in the rotator cuff compromised patient.

Revision of reverse shoulder arthroplasty can be difficult due to glenoid bone loss, frequently requiring bone grafting making this a two-stage salvage procedure. In contrast, superior humeral resurfacing preserves valuable bone stock and allows for a successful conversion to stemmed hemi, total or reverse shoulder arthroplasty, if necessary.

End-stage procedures such as reverse shoulder arthroplasty can be very efficacious, but should be reserved for patients older than 70 years with severe rotator cuff arthropathy. Young and active patients with Compensated Cuff Arthropathy can benefit from pain relief and secondary functional improvement through superior humeral resurfacing while avoiding subscapularis deficiencies.

**Table 1:**

**Benefits of HemiCAP resurfacing in Compensated Cuff Arthropathy:**

- Less invasive, Bone preserving, Minimal skin incision, Minimal blood loss, No transfusion required, Subscapularis preservation, Shorter operative time, Outpatient procedure, Fast rehabilitation, Pain relief, Improved mechanical symptoms, No activity limitation, No bridges burned. Good to excellent patient satisfaction, Good to excellent resolution of symptoms

**Comparison to Surgical Alternatives:**

- Faster return to activity and sporting, Faster return to work, Lower complication rate

**References:**

2. Weighted national estimates from HCUP Nationwide Inpatient Sample (NIS), 2011, Agency for Healthcare Research and Quality (AHRQ), based on data collected by individual States and provided to AHRQ by the States. http://hcupnet.ahrq.gov/HCUPnet.jsp accessed 07/05/2013